CLAIMS

1. A method for performing magnetic force microscopy comprising:

providing a probe comprising a material having temperature-dependent magnetic properties, the probe having a tip adapted for observing a surface of a sample; and

heating the probe.

2. The method of claim 1, wherein the probe tip is tapered.

3. The method of claim 1, wherein the step of heating the probe comprises:

heating the probe using a time-varying heat source.

4. The method of claim 1, wherein the probe is coated with the material having temperature-dependent magnetic properties.

5. The method of claim 1, wherein the probe comprises:

a ferromagnetic or paramagnetic material.

6. The method of claim 5, wherein said ferromagnetic or paramagnetic material has a low Curie temperature.

7. The method of claim 1, wherein the probe comprises a ferrimagnetic material.

8. The method of claim 7, wherein the probe comprises a (Gd, Tb, Dy)-(Fe, Co) alloy.

9. The method of claim 5, wherein the step of heating the probe comprises:

oscillating the temperature of the probe over a range of values having a lower limit below a compensation temperature of the probe material and an upper limit above the compensation temperature.

10. The method of claim 1, wherein the step of heating the probe comprises:

focusing a laser on the tapered tip of the probe.

11. The method of claim 10, wherein the step of focusing the laser further comprises:

modulating the laser power that heats the probe tip.

12. The method of claim 1, wherein the step of providing the probe further comprises:

providing a two-conductor electrode to the probe tip.

13. The method of claim 12, wherein the step of heating the probe comprises:

coupling a current source to the probe; and

applying a current to the probe.

14. The method of claim 1, wherein the step of heating the probe comprises:

heating a magnetic coating on the tip from within a core of the probe.

15. The method of claim 14, wherein the probe comprises a transparent material coated with a heat-conducting material.

16. The method of claim 15, wherein the probe comprises an optical fiber pulled to form a probe.

17. The method of claim 15, wherein the step of heating the core of the probe comprises focusing a laser through the core of the probe.

18. A magnetic force microscope comprising:

a cantilever adapted for oscillating, wherein the cantilever has a first end and a second end;

a probe coupled to the second end of the cantilever, wherein the probe has a tip comprising a low Curie temperature material;

a laser adapted for illuminating the second end of the cantilever;

an optical detector adapted for detecting light reflected by the cantilever; and

a heat source adapted for heating the probe.

19. The magnetic force microscope of claim 18, wherein the heat source is a time-varying heat source adapted to modulate heat to the probe.

20. A magnetic force microscope comprising:

a cantilever adapted for oscillating, the cantilever having a first end and a second end;

a probe coupled to the second end of the cantilever, the probe having a tapered tip comprising a ferrimagnetic material;

a motion detector adapted for detecting deflection of the cantilever; and

a heat source adapted for heating the probe.

21. The magnetic force microscope of claim 19, wherein the heat source is a time-varying heat source adapted to modulate heat to the probe.